Kissinger, Lon

From: gobas <gobas@sfu.ca>
Sent: Monday, February 15, 2016 7:35 PM
To: Kissinger, Lon
Cc: Shephard, Burt
Subject: Re: Developing AWQC that reflect both water and fish consumption contaminant exposure.

Hi Lon

Sorry for the delay in response. Yes, you are right that in the model we provided, the concentrations in drinking water are not related to the concentration in the fish. The underlying reason is that in most cases drinking water is treated and in the treatment process the concentration of contaminants (in most cases) are much reduced over those in the treatment plant's intake water. Also, in certain cases and perhaps in yours as well, the source of drinking water can be different from that to which the fish are exposed, e.g. well water, spring water, bottled water. The approach outlined in your e-mail is good as long as the BCF that we calculate applies to drinking water. The spreadsheets can be adapted to accommodate this change. It should be a minor effort, easily done.

One suggestion is to do a sensitivity analysis and see for which of the contaminants water consumption provides a significant route of intake compared to fish consumption. Then, for those contaminants for which drinking water is indeed a significant source of intake, evaluate if drinking water and ambient water can be expected to exhibit similar concentrations.

Let me know if you want us to make the suggested changes to the model.

All the best!

Frank

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> On Feb 10, 2016, at 10:06 AM, Kissinger, Lon <Kissinger.Lon@epa.gov> wrote:
>
> Hi Frank,
>
> We had been talking about how it would be desirable to develop criteria that resulted in acceptable risks and hazards considering joint exposure to contaminants in water and fish. The analysis included in the report assumed that contaminant concentrations in drinking water and river water differed. In actuality, it is appropriate to treat them as being equal. The assumption is that individuals would obtain both drinking water and fish from the same body of water. Burt had suggested that the BCFs you provided would be stable over the water column concentration ranges in question, assuming the fish lipid contents remains unchanged from the existing model. Hence, I was wondering if we could come up with criteria that accounted for both water and fish exposures using the following approach:
>
> **Cancer**
> $R = CSF\ (dose_f + dose_w)$
> $R = CSF\ ((CR_f \times C_f)/BW + (CR_w \times C_w)/BW)$

$R = CSF ((CRf \times C_w \times BCF)/BW + (CRw \times Cw)/BW)$
$R = (CSF \times C_w)/BW \times (CR_f \times BCF + CR_w)$
$C_w = (BW \times R) \times 1/(CR_f \times BCF + CR_w)$

Non-cancer
$RfD = dose_f + dose_w$
$RfD = (CR_f \times C_f)/BW + (CR_w \times C_w)/BW$
$RfD = (CRf \times C_w \times BCF)/BW + (CRw \times Cw)/BW$
$RfD = C_w/BW \times (CR_f \times BCF + CR_w)$
$C_w = (BW \times RfD) \times 1/(CR_f \times BCF + CR_w)$

Where:
R = cancer risk
CSF = cancer slope factor
CR_f = fish consumption rate
C_f = contaminant concentration in fish
BW = body weight
CR_w = water ingestion rate
C_w = water concentration
BCF = bioconcentration factor
RfD = reference dose

Please let me know if you see any issues with this. I believe we can use information in the existing spreadsheets to revise the criteria.

Regards,
Lon

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